Essential Role of Nr2f Nuclear Receptors in Patterning the Vertebrate Upper Jaw.

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Public Summary:

Scientific Abstract:
The jaw is central to the extensive variety of feeding and predatory behaviors across vertebrates. The bones of the lower but not upper jaw form around an early-developing cartilage template. Whereas Endothelin1 patterns the lower jaw, the factors that specify upper-jaw morphology remain elusive. Here, we identify Nuclear Receptor 2f genes (Nr2fs) as enriched in and required for upper-jaw formation in zebrafish. Combinatorial loss of Nr2fs transforms maxillary components of the upper jaw into lower-jaw-like structures. Conversely, nr2f5 misexpression disrupts lower-jaw development. Genome-wide analyses reveal that Nr2fs repress mandibular gene expression and early chondrogenesis in maxillary precursors. Rescue of lower-jaw defects in endothelin1 mutants by reducing Nr2f dosage further demonstrates that Nr2f expression must be suppressed for normal lower-jaw development. We propose that Nr2fs shape the upper jaw by protecting maxillary progenitors from early chondrogenesis, thus preserving cells for later osteogenesis.